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Field Evaluation of Chilli Genotypes for Resistance to Powdery Mildew Caused By *Leveillula taurica* (Lev.) Arn

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Powdery mildew of chilli caused by *Leveillula taurica* (Lev.) Arn. is a major constraint for chilli production in many chilli growing states of India. In severely affected plants, defoliation, reduction in photosynthesis and in drastic reduction of fruit yield is often observed. With an aim to search for resistance source against powdery mildew, seventy genotypes were evaluated under field conditions during *Kharif* and *rabi* 2015. Among seventy, the genotypes *viz*., DCA-1, DCA-2, DCA-3, DCA-4, DCA-5, DCA-6, DCA-7, DCA-8, DCA-9, DCA-10, DCA-11, DCA-12, DCA-13, DCA-14, DCA-22, DCA-23, DCA-24, DCA-25, DCA-26, DCA-35, DCA-42, DCA-44, DCA-45, DCA-57 and DCA-59 showed moderately resistant reaction during both *kharif* and *rabi* seasons and none of them were found resistant.

Keywords: Chilli, Powdery mildew, Resistance, Genotypes.

Chilli (*Capsicum annuum* L.) is an important tropical and subtropical spice and vegetable crop. It is an important constituent of food, adding flavour, colour, vitamin C and pungency. It is also used as medicinal herb and ornamental plants in different parts of the world. It is therefore indispensable to the world food and industries. However, the chilli crop is highly susceptible to powdery mildew caused by *Leveillula taurica* (Lev.) Arn.

The powdery mildew occurs throughout the year under favorable conditions and it is more severe in late sown *kharif* crop. Powdery mildew has long been known as important disease of plants in all parts of the world. The disease noticed generally on all aerial parts of the plants which cause both qualitative and quantitative loss of dry fruit yield. The reduction in photosynthetic activity and physiological changes are considerable, which lead to potential decrease in yield (24-80%) depending on stage and time at which the disease appears (Mathur *et al.*, 1972; Sharmila *et al*., 2006). However, disease intensity depends upon the cultivar, growing period and environmental conditions. The disease has world-wide importance, occurring wherever it is grown. The loss caused by chilli powdery mildew is proportional to the disease severity varies remarkably depending on the stage of infection, genotypes and environmental conditions. Many fungicides have been recommended by several workers (Pawar *et al*., 1985; Sekhar *et al*., 1988; Mahajan *et al*.,1991) to control this disease.

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However, the use of fungicide is expensive and not eco-friendly. The best approach to control the disease is by using the resistant varieties. Screening for disease resistance is essential to identify resistant variety / source and also cultivation of resistant genotypes is an effective and cheaper method to combat the disease. However, there is need to screen the genotypes against powdery mildew of chilli. Hence, in the study an attempt was made to identify resistant genotypes against chilli powdery mildew.

MATERIALS AND METHODS

For the confirmation of resistance, a field experiment was conducted during *kharif* and *rabi* 2015 at College of Agriculture, University of Agricultural and Horticultural Sciences, Shivamogga under natural epiphytotic conditions. Seventy chilli genotype seeds were sown in plastic trays along with Byadagi Kaddi and Bydagi dabbi varieties as susceptible check. Each entry was transplanted in 4.2 m length row and was replicated twice. All the recommended package of practices was applied except protection for control of powdery mildew under natural filed condition. Later, the observations on the intensity of powdery mildew disease was recorded using 0-9 scale given by Mayee and Datar (1986) on five marked plants of each genotype at fruiting stage of the crop. The recorded grade values were converted into Percent Disease Index (PDI) by using following formula proposed by Wheeler (1969). These seventy genotypes were further grouped into six categories based on reaction type as given by Khare and Lakpale (1997).

RESULTS AND DISCUSSION

Field experiments were conducted to identify resistant sources against powdery mildew. Available genotypes were screened under field condition at the department of Plant Pathology, University of Agricultural and Horticultural Sciences, Shivamogga during *kharif* and *rabi* 2015. Totally seventy genotypes were screened under natural field condition and the disease severity was recorded using 0-9 scale by randomly selecting five plants. Based on their reaction genotypes were categorised into immune, resistant, moderately resistant, susceptible and highly susceptible, using 0 to 9 scale.

During *kharif* 2015, , out of seventy genotypes screened, none of them were found to be immune, however, twenty five genotypes viz., DCA-1, DCA-2, DCA-3, DCA-4, DCA-5, DCA-6, DCA-7, DCA-8, DCA-9, DCA-10, DCA-11, DCA-12, DCA-13, DCA-14, DCA-22, DCA-23, DCA-24, DCA-25, DCA-26, DCA-35, DCA-42, DCA-44, DCA-45, DCA-57 and DCA-59 were found moderately resistant and forty three genotypes were found moderately susceptible. Remaining two Byadagi Kaddi and Byadagi Dabbi genotypes were found highly susceptible (Table 1). Similar trend was observed during *rabi* season also. Among seventy chilli genotypes screened none of them were found Immune (I) to powdery mildew disease. However, twenty five genotypes *viz*., DCA-1, DCA-2, DCA-3, DCA-4, DCA-5, DCA-6, DCA-7, DCA-8, DCA-9, DCA-10, DCA-11, DCA-12, DCA-13, DCA-14, DCA-22, DCA-23, DCA-24, DCA-25, DCA-26, DCA-35, DCA-42, DCA-44, DCA-45, DCA-57 and DCA-59 were found moderately resistant and remaining 43 genotypes were found moderately

Powdery mildew disease scale

Scale	Disease reaction	Per cent leaf area covered
0	Immune (I)	No symptom of powdery mildew
1	Highly Resistant (HR)	Small scattered specks covering 1% or less leaf area
3	Resistant (R)	Small powdery lesions covering 1-10% of leaf area
5	Moderately resistant (MR)	Powdery lesions enlarged covering 11-25% leaf area
7	Moderately Susceptible (MS)	Powdery lesions coalesce to form big patches covering 26-50% of leaf area
9	Highly Susceptible (HS)	Big powdery patches covering 51% or more of leaf area and defoliation occur

susceptible and other two susceptible check varieties Byadagi Kaddi and Byadagi Dabbi were found highly susceptible under field condition (Table 2).

Results of the present study are in agreement with who reported Wankhade and Mohir (2015) differential reactions of different chilli genotypes. These moderately resistant genotypes could be used in further breeding programme for the development of resistant varieties of chilli against powdery mildew. Several workers reported that there is variation in resistance among the genotypes against powdery mildew of chilli (Pawar *et al*., 1985; Bidari *et al*., 1985; Anand *et al*., 1987). Sharmila (2006) reported that, Pant C-1, SIC-10-166 and PMR-21 were resistant to chilli powdery

Table 1. Screening of chilli genotypes against powdery mildew of chilli caused by *Leveillula taurica* under field conditions during *kharif* 2015

Sl. No.	Genotypes	Disease score	Disease reaction	Sl. No.	Genotypes	Disease score	Disease recation
1	DCA-1	5	MR	36	DCA-36	7	MS
2	DCA-2	5	MR	37	DCA-37	7	MS
3	DCA-3	5	MR	38	DCA-38	7	MS
4	DCA-4	5	MR	39	DCA-39	7	MS
5	DCA-5	5	MR	40	DCA-40	7	MS
6	DCA-6	5	MR	41	DCA-41	7	MS
7	DCA-7	5	MR	42	DCA-42	5	MR
8	DCA-8	5	MR	43	DCA-43	7	MS
9	DCA-9	5	MR	44	DCA-44	5	MR
10	DCA-10	5	MR	45	DCA-45	5	MR
11	DCA-11	5	MR	46	DCA-46	7	MS
12	DCA-12	5	MR	47	DCA-47	7	MS
13	DCA-13	5	MR	48	DCA-48	7	MS
14	DCA-14	5	MR	49	DCA-49	7	MS
15	DCA-15	7	MS	50	DCA-50	7	MS
16	DCA-16	7	MS	51	DCA-51	7	MS
17	DCA-17	7	MS	52	DCA-52	7	MS
18	DCA-18	7	MS	53	DCA-53	7	MS
19	DCA-19	7	MS	54	DCA-54	7	MS
20	DCA-20	7	MS	55	DCA-55	7	MS
21	DCA-21	7	MS	56	DCA-56	7	MS
22	DCA-22	5	MR	57	DCA-57	5	MR
23	DCA-23	5	MR	58	DCA-58	7	MS
24	DCA-24	5	MR	59	DCA-59	5	MR
25	DCA-25	5	MR	60	DCA-60	7	MS
26	DCA-26	5	MR	61	DCA-61	7	MS
27	DCA-27	7	MS	62	DCA-62	7	MS
28	DCA-28	7	MS	63	DCA-63	7	MS
29	DCA-29	7	MS	64	DCA-64	7	MS
30	DCA-30	7	MS	65	DCA-65	7	MS
31	DCA-31	7	MS	66	DCA-66	7	MS
32	DCA-32	7	MS	67	DCA-67	7	MS
33	DCA-33	7	MS	68	DCA-68	7	MS
34	DCA-34	7	MS	69	Byadagi Kaddi	9	HS
35	DCA-35	5	MR	70	Byadagi Dabbi	9	HS

mildew. Among 179 genotypes NIC-23906 was resistant, 14 genotypes (EC-321467, EC-334182, EC-345674-1, EC-378630, EC-378634, EC-378688, EC-382017, EC- 382110, EC-390029, EC-391094, IC-255906, NIC-19969, NIC-23897, PBC-371) were moderately resistant, 60 genotypes were susceptible and 99 genotypes were highly susceptible under field conditions (Pandava, 2006). In 2015, Wankhade and Mohir showed that, Phule Jyoti and Nandi were resistant and four genotypes CH-1, Pant C-1, Pusa Sadaabahar and Khurasani were moderately resistant. Though the germplasm lines are resistance source to the breeders, they have to be used in breeding programme for the development of new varities for the benefit of farmers.

The management of the disease through host plant resistance has been the best and cheapest choice in all the crops. Utilisation of resistant cultivars in farming systems is the most simple, effective and economical method in the management of disease. Besides this, these

Table 2. Screening of chilli genotypes against powdery mildew of chilli caused by *Leveillula taurica* under field conditions during *rabi* 2015

Sl. No.	Genotypes	Disease score	Disease reaction	Sl. No.	Genotypes	Disease score	Disease recation
1	DCA-1	5	MR	36	DCA-36	7	MS
2	DCA-2	5	MR	37	DCA-37	7	MS
3	DCA-3	5	MR	38	DCA-38	7	MS
4	DCA-4	5	MR	39	DCA-39	7	MS
5	DCA-5	5	MR	40	DCA-40	7	MS
6	DCA-6	5	MR	41	DCA-41	7	MS
7	DCA-7	5	MR	42	DCA-42	5	MR
8	DCA-8	5	MR	43	DCA-43	7	MS
9	DCA-9	5	MR	44	DCA-44	5	MR
10	DCA-10	5	MR	45	DCA-45	5	MR
11	DCA-11	5	MR	46	DCA-46	7	MS
12	DCA-12	5	MR	47	DCA-47	7	MS
13	DCA-13	5	MR	48	DCA-48	7	MS
14	DCA-14	5	MR	49	DCA-49	7	MS
15	DCA-15	7	MS	50	DCA-50	7	MS
16	DCA-16	7	MS	51	DCA-51	7	MS
17	DCA-17	7	MS	52	DCA-52	7	MS
18	DCA-18	7	MS	53	DCA-53	7	MS
19	DCA-19	7	MS	54	DCA-54	7	MS
20	DCA-20	7	MS	55	DCA-55	7	MS
21	DCA-21	7	MS	56	DCA-56	7	MS
22	DCA-22	5	MR	57	DCA-57	5	MR
23	DCA-23	5	MR	58	DCA-58	7	MS
24	DCA-24	5	MR	59	DCA-59	5	MR
25	DCA-25	5	MR	60	DCA-60	7	MS
26	DCA-26	5	MR	61	DCA-61	7	MS
27	DCA-27	7	MS	62	DCA-62	7	MS
28	DCA-28	7	MS	63	DCA-63	7	MS
29	DCA-29	7	MS	64	DCA-64	7	MS
30	DCA-30	7	MS	65	DCA-65	7	MS
31	DCA-31	7	MS	66	DCA-66	7	MS
32	DCA-32	7	MS	67	DCA-67	7	MS
33	DCA-33	7	MS	68	DCA-68	7	MS
34	DCA-34	7	MS	69	Byadagi Kaddi	9	HS
35	DCA-35	5	MR	70	Byadagi Dabbi	9	HS

Table 3. Reaction of chilli genotypes against powdery mildew caused by *Leveillula taurica*

Grade	Reaction	% leaf area infected	*Kharif* 2015	*Rabi* 2015
0	Immune	0	-	-
1	Highly resistant	Upto 1	-	-
3	Resistant	1-10	-	-
5	Moderately Susceptible	11-25	DCA-1, DCA-2, DCA- 3, DCA-4, DCA-5, DCA-6, DCA-7,DCA-8, DCA- 9, DCA-10, 11, 12, 13, 14,22, 23, 24, 25, 26, 35,42, 44, 45, 57, 59	
7	Susceptible	26-50	DCA-15, 16, 17, 18,19, 20, 21, 27, 28, 29,30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 43,46, 47, 48, 49, 50, 51,52, 53, 54, 55, 56, 58, 60, 61, 62, 63, 64, 65,66, 67, 68	
9	Highly Susceptible	>50	Byadagi Kaddi,Byadagi Dabbi	

resistant cultivars conserve natural resources and reduce the cost, time and energy compared to the other methods of disease management.

In the present study, as many as seventy genotypes were screened under field conditions against powdery mildew resistance and none of them were found immune or resistant. However twenty five genotypes were found moderately resistant and forty three found moderately susceptible.

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